
New breeding records of Roseate Tern *Sterna dougallii* in Seychelles

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Nouvelles données sur la nidification de la Sterne de Dougall *Sterna dougallii* aux Seychelles. La plus grande colonie de Sternes de Dougall *Sterna dougallii* aux Seychelles se trouve sur l'île Aride avec un petit nombre de couples qui nichent sur l'île aux Fous toute proche, et on trouve des colonies plus petites dans les îles éloignées Etoile et Bancs africains. L'espèce a disparu de beaucoup d'îles où elle nichait dans le passé. Dans le cadre du recensement d'oiseaux marins dans les îles éloignées des Seychelles lancé par la Fondation pour la Conservation des Îles (Island Conservation Society, ICS), la nidification de cette sterne a maintenant été confirmée sur l'île de Goëlettes (atoll de Farquhar) pour la première fois depuis 1897, avec la découverte d'une petite colonie de 15 couples. Une colonie auparavant inconnue a également été découverte sur l'atoll de St Joseph, avec 350 couples sur l'île Chien et trois couples sur l'île Ressource. Des prospections complémentaires sont prévues par ICS afin de recenser toutes les populations nicheuses d'oiseaux marins des îles éloignées des Seychelles, en particulier à l'île Bancs du Sud, sur l'atoll de Providence, où l'information manque depuis 1970. L'atoll de Saint Joseph est proposé comme une Zone Importante pour la Conservation des Oiseaux.

Summary. The largest colony of Roseate Terns *Sterna dougallii* in Seychelles is on Aride Island, with a small number of breeding pairs on neighbouring Booby Island; smaller colonies are also present in the outer islands at Etoile and African Banks. The species has disappeared from many islands where it was previously recorded. As part of the Outer Island Seabird Survey, launched by Island Conservation Society (ICS) of Seychelles, breeding has now been confirmed at Goëlettes, Farquhar, for the first time since 1897, with the discovery of a small colony of 15 pairs. A previously unknown colony has been discovered at St Joseph Atoll, with 350 pairs at Île Chien and three pairs on Île Ressource. Further work is planned by ICS to assess seabird populations in the outer islands of Seychelles, including at Bancs du Sud (Providence Atoll), where there has been no report of Roseate Terns since 1970. St Joseph Atoll is proposed as an Important Bird Area.

Although the Roseate Tern *Sterna dougallii* is not considered globally threatened, its populations have declined dramatically throughout most of its range during recent decades (Avery *et al.* 1995, Gochfeld & Burger 1996), and it is one of the rarest breeding seabirds in the Indian Ocean. A recent genetic study of seven populations from throughout the world, including Seychelles and South Africa, indicates two distinct lineages, one in the Atlantic and another in the Indo-Pacific, with continental Africa acting as a barrier to gene-flow (Lashko 2004). Given this finding, it has been suggested that the 3–4 currently recognised subspecies in the Indo-Pacific should be merged under the name *S. d. gracilis*, although Seychelles breeders appear divergent from those of the eastern Indian Ocean and Pacific Ocean (Tree 2005). There are apparently two major populations in the western Indian Ocean,

one usually recognised as *S. d. arideensis*, breeding from Seychelles south to Cargados Carajos, and the other an intermediate form, genetically similar to the Atlantic nominate race, in Madagascar, East Africa and South Africa. Geographical variation mainly involves bill colour when breeding, with Seychelles birds having up to 100% red bills (Malling Olsen & Larsson 1995).

Known Roseate Tern colonies in Seychelles

The largest colony in Seychelles is on Aride Island. In 1973, when Aride was acquired as a nature reserve, 2,500 pairs were present (Procter 1974). The population rose to 4,300–4,800 pairs in 1975 (Warman 1977, 1979), then declined to 900–1,000 pairs in 1988 (Bullock 1988), reaching a low point of 426 pairs in 1994 (Ayrton 1995). In the present century, the population has varied between 607 pairs in 2004 and 1,276 pairs in

2002 (Monticelli & Ramos 2005), with 779 pairs in 2005 (D. Monticelli *in* Carty & Carty 2005). Elsewhere in the western Indian Ocean, major colonies with more than 1,000 pairs have been reported from Madagascar and East Africa (Langrand 1990, Fishpool & Evans 2001).

A small number of birds attempt to breed in most years on Booby Island, 3 km south of Aride, with 128 pairs present in 2003 and 89 in 2004 (Monticelli & Ramos 2005), but only 17 pairs in 2005 (D. Monticelli *in* Carty & Carty 2005). Booby Island is theo-retically protected as a nature reserve, declared under the Wild Birds Protection (Nature Reserve) Regulations 1966, but it is uninhabited and heavily poached. As a result it is unlikely that there has been any successful breeding in recent years.

Apart from Aride and Booby in the granitic islands, the only known breeding sites in Seychelles at the turn of the 21st century were in the coralline outer islands, at African Banks and Etoile. The African Banks colony numbered 250–300 pairs in 1966 (Ridley & Percy 1966) but only 82 pairs by 1997 (C. J. Feare, P. Constance & R. Nolin *pers. comm.*). Etoile has not been visited

by an ornithologist since 1995 when *c.*150 pairs were present (Skerrett 1995). Like Booby, Etoile is a nature reserve under the 1966 regulations, whilst African Banks receives a degree of legal protection as an area of restricted access. However, both are also uninhabited, thus there is no control of unauthorised visits. It is known that tern colonies on African Banks are heavily poached and it would be surprising if this is not also the case on Etoile.

Roseate Terns may also breed at Bancs du Sud, Providence Atoll, where nests with chicks were last observed in 1970 (G. Savy *pers. comm.*). There have been no visits by an ornithologist during the breeding season since. A few birds were recorded on Cosmoledo (two individuals in June 1999 on Menai: Rocamora *et al.* 2003), but without evidence of breeding. Historically, colonies of Roseate Terns have disappeared from the islands of Mamelles, Île Sèche, Île aux Récifs, Île aux Vaches Marines, Bird, and probably others. Roseate Terns were noted on Mamelles, where breeding was reported in 1936 (Vesey-Fitzgerald 1936), but by 1955 they had disappeared (Ridley & Percy 1956). Île aux Vaches Marines is mentioned as having 'a large colony of Roseate Terns' in 1955

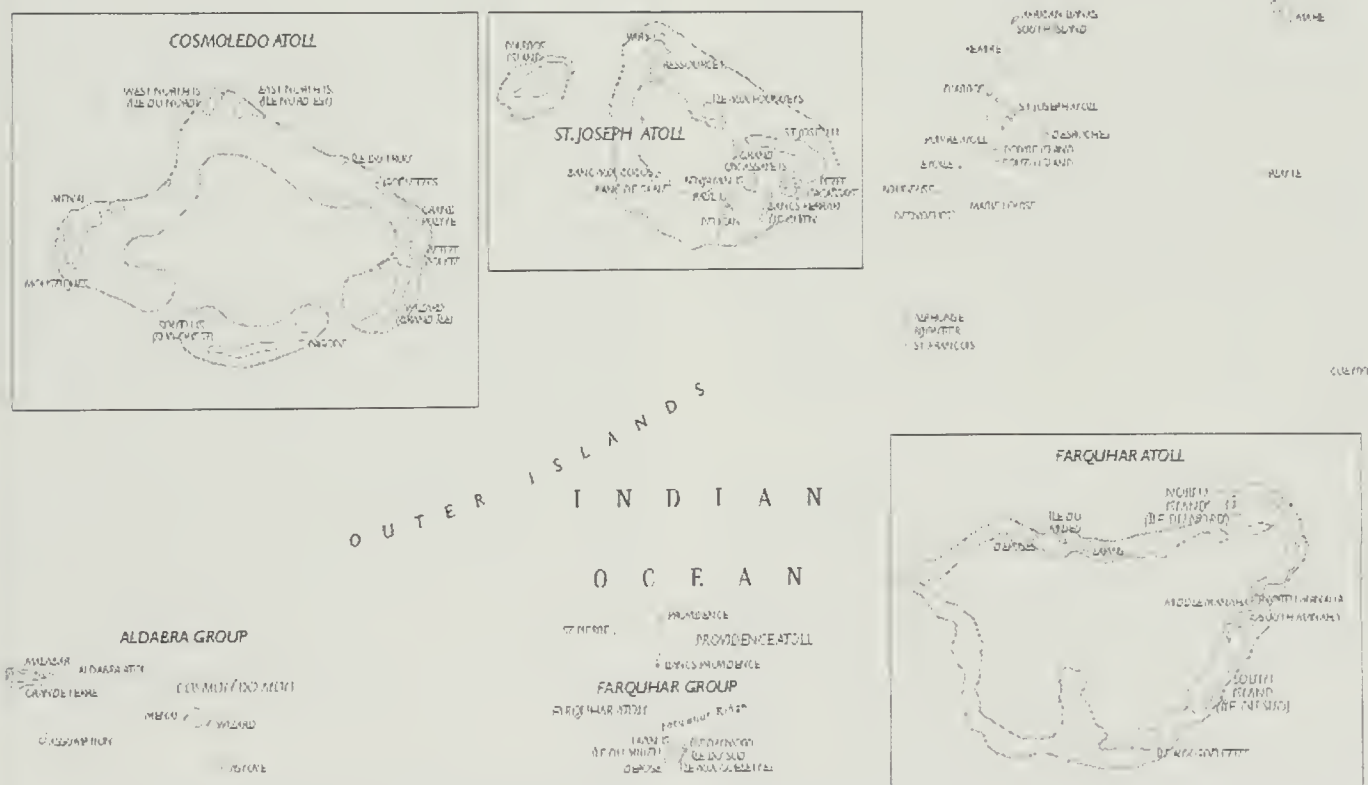


Figure 1. Map of Seychelles showing the major localities mentioned in the text (reproduced with kind permission of A. & C. Black).

Carte des Seychelles avec les localités les plus importantes mentionnées dans le texte (reproduite avec l'autorisation de A. & C. Black).

(Ridley & Percy 1958), but breeding ceased during the mid-1980s, the last record being in 1982 (Skerrett 1994). Île Sèche and Île aux Récifs are mentioned in some references as breeding sites, though without details. The Cargados Carajos population has been estimated at 400 pairs (Safford 2001). The all-red bill colour suggests a close relationship with Seychelles birds.

Island Conservation Society (ICS) and the Outer Island Seabird Survey

Island Conservation Society, a Seychelles NGO, leases and manages Aride Island Nature Reserve, where it conducts annual surveys of the Roseate Tern colony in collaboration with Dr Jaime Ramos of Coimbra University, Lisbon, Portugal. ICS has also been mandated as conservation partners to the Islands Development Company (IDC), the Seychelles parastatal responsible for management of the outer islands (coralline islands west and south of the main island of Mahé), except Aldabra Atoll (managed by Seychelles Islands Foundation), Coëtivy (a prawn farm operated by Seychelles Marketing Board) and the privately owned D'Arros and St Joseph Atoll.

ICS has identified the Outer Island Seabird Survey as a priority programme for 2004–09, with a view to censusing all seabird populations in the outer islands of Seychelles. Islands are visited opportunistically, utilising the transport facilities of IDC, but funding is being sought for additional visits. To date, IDC has facilitated visits to some islands including Cosmoledo Atoll and Farquhar Atoll. D'Arros Development Limited has facilitated an initial visit to D'Arros and St Joseph Atoll.

Rediscovery of a small breeding colony on Farquhar

On 10 July 1897, Cmdr. Stuart Farquhar visited Goëlettes, Farquhar Atoll, one of the ten islands comprising the atoll and the most southerly point of Seychelles. (Despite the coincidence of surnames, it is not Stuart Farquhar who is honoured by the name of the atoll, but Sir Robert Townsend Farquhar, Governor of Mauritius in 1810–23.) He reported a dense colony of Roseate Terns, with some nests having one, two or even three eggs, and a few with chicks (Farquhar 1900). There were no further visits by any ornithologist at this season and no reports of Roseate Terns at Farquhar for a century.

On 25 June 1999, we visited Goëlettes for less than two hours with C. J. Feare, E. Greig and M. Athanase. The 26-ha large island is mainly flat, with a few sand dunes and a small crater, reportedly caused by a meteorite. Whilst other members of the party concentrated on a rapid assessment of the large Sooty Tern *S. fuscata* colony, AS walked the perimeter of the island using two hand-held GPS devices to measure the island's size and shape, and to make general observations of nesting terns. A flock of *c.*50 Roseate Terns was found close to the high-tide line but with no evidence of nesting (Skerrett 1999). Although birds can be expected to have eggs or chicks at this time of year, the apparent absence of these does not prove that breeding was not attempted in 1999, as a shortage of time prevented a thorough investigation of all potential sites (including the small sandy island of Banc de Sable).

GR visited Goëlettes again on 21–24 June 2005 with T. Cafrine and G. Maillet from IDC. More than 330,000 pairs of Sooty Terns occupied most of its centre, with thousands of pairs of Brown Noddies *Anous stolidus* nesting at the edges of the colony. Roseate Terns were flying amidst hundreds of Sooty Terns and Brown Noddies. Fifteen rudimentary and well-camouflaged nests, merely small depressions in a sparsely vegetated sand dune, were located in a small area not exceeding *c.*20 m × 5 m, a few metres from the beach at the north-western side of the island. They were 1–3 m apart and 11 contained single small brownish eggs with blackish marks. On the beach, 20 m distant, were three adult Black-naped Terns *Sterna sumatrana* feeding three recently fledged juveniles. T. Cafrine (pers. comm.) confirmed he had counted *c.*15 chicks of this species a few weeks previously in the same area.

The breeding success of the Roseate Terns could not be checked later in the season and we do not know whether the 11 eggs hatched. If so, the heavy infestation of ticks on Goëlettes at the time of our visit may have occasioned a serious mortality, as it did on Sooty Tern chicks in this year (pers. obs.).

Discovery of an unknown colony on St Joseph Atoll

On 21 July 2005 AS and Judith Skerrett visited St Joseph Atoll (Skerrett & Skerrett 2005), first landing on the island of Ressource. Five Roseate Terns

were observed, three of which were incubating eggs. Eight Black-naped Terns *Sterna sumatrana*, four of them incubating eggs, were nesting colonially with the Roseate Terns.

The next day, the islands in the east of the atoll were visited. A colony of Roseate Terns was found on the island of Chien. In order not to cause disturbance, it was circled in the boat at a distance sufficient for birds not to leave their eggs. Approximately 500 individuals were counted. It should be noted, however, that not all the birds in the colony were likely to be present and that the count was complicated because the colony was not visible in its entirety from any single point due to vegetation and the topography of the beach.

The impression from this short visit was that the density of nests was very high, particularly at the edge of the colony, but variable and interrupted in places by the profile of the beach or by flotsam debris. The colony covered an area of $c.50 \text{ m} \times c.3.5 \text{ m}$, equal to 175 m^2 . The mean density was roughly estimated at $c.2$ pairs per 1 m^2 , equal to a population of $c.350$ pairs. On Aride, nest density varies from $1.23/\text{m}^2$ at the centre of the colony to $0.63/\text{m}^2$ at the edge, with a mean distance of $c.0.5 \text{ m}$ from the nearest neighbour (Ramos 1998). In Africa, nest density is $0.2\text{--}4.0/\text{m}^2$ (Urban *et al.* 1986). The proportion of nests with two eggs was high, perhaps $c.30\%$, though this is a very rough estimate based only on a small area of the colony.

This is the first record of Roseate Terns breeding at St Joseph Atoll. It remains to be established if this colony is occupied annually. However, there are earlier observations of Roseate Terns in the vicinity. Betts (1998) reported observing 420 Roseate Terns feeding a mile north of St Joseph on 10 June 1998. He estimated this might indicate a colony of 300–400 pairs somewhere in the northern Amirantes. In the light of the new evidence, it seems likely that the birds observed by Betts came from St Joseph Atoll; his estimate is remarkably similar to the current one.

Threats and conservation

The future of the Roseate Tern as a breeder in Seychelles has been a cause of great concern, the Aride colony being the only one given any degree of protection by resident conservation staff. Roseate Terns are prone to human disturbance, especially early in the breeding season when entire colonies may desert. Direct human predation has

eliminated the species from much of its former range, especially due to egg collecting. Rats and other introduced predators may also have contributed to the decline. Problems with food supply appear to be the main factor affecting breeding success, which could be linked to over-exploitation of inshore fishing stocks, or changes in water temperature and ocean currents (Ramos 2000).

Introduced Barn Owls *Tyto alba* have preyed on Roseate Terns on Aride, accounting for 4% of the breeding population in 1993 (Ayrton 1995), but following implementation of control measures, in 1996, losses have been virtually eliminated (Bowler & Hunter 2000), except in 2006 when 42 adults were killed by a single owl (B. Sampson pers. comm.). *Pisonia* seeds are a potential hazard as they stick to feathers, preventing flight; therefore, staff check colonies on Aride for fallen seed piles prior to the nesting season. Heavy tick infestation may kill many young, with fledging success of tick-infested nestlings being less than half that of non-infested nestlings in some years; ironically, frequent breeding failures result in lower infestation in subsequent years which benefits the birds (Ramos *et al.* 2001). Interbreeding grounds of Seychelles birds are unknown and the possibility of significant mortality due to certain fishing practices or trapping outside the region remains, as is the case in West Africa (e.g. Rocamora *et al.* 1993).

The rediscovery of a small colony on Goëlettes and the discovery of a significant colony on St Joseph Atoll is extremely encouraging. None of the islands is inhabited and they are conservation-friendly, being managed by nearby human residents.

Future monitoring and research

On Farquhar, ICS plans to monitor regularly (every 1–2 years) the numbers of breeding pairs of Roseate Terns and other ground-nesting terns (Sooty Tern, Brown Noddy, Black-naped Tern and possibly Greater Crested Tern *Sterna bergii*) on Goëlettes or other rat-free islands of the atoll.

On St Joseph a more precise population estimate is needed and we recommend that the newly discovered Roseate Tern colony be monitored annually. Difficulty of access to St Joseph Atoll (easily accessible only during spring tides) and a total absence of infrastructure on the islands limit

considerably the possibilities for any close monitoring and research. It would nevertheless be highly desirable to investigate the existence of possible exchanges with Aride through ringing, and to assess periodically the breeding success of the colony and the factors that affect it.

Roseate Terns and Important Bird Areas (IBAs)

Goëlettes is already recognised as a part of the 'Islets of Farquhar Atoll' Important Bird Area (Rocamora & Skerrett 2001), as threshold criteria for Sooty Tern and Black-naped Tern are met. Despite being very small, the Roseate Tern colony of Goëlettes increases the ornithological interest of this IBA and adds a breeding site to the species' distribution. Future monitoring will demonstrate whether this colony is regularly occupied or not. Aride Island, African Banks and Etoile, the other breeding sites for Roseate Tern known at the time of the first inventory of Important Bird Areas, are also recognised as IBAs.

St Joseph Atoll was included in the proposal for the first inventory of IBAs (Rocamora & Skerrett 1998). However, it was removed from the final inventory because data were considered insufficient. Though more data are still desirable, available evidence now confirms that St Joseph Atoll meets the threshold criteria for consideration as an IBA for three breeding species. These are:

	A4i (waterbirds) Threshold	A4ii (seabirds) Threshold	St Joseph population
<i>Sterna dougallii</i>	400 birds		c.350 pairs
<i>Sterna sumatrana</i>	2 birds		c.10 pairs
<i>Puffinus pacificus</i>		15,000 pairs	c.23,000 pairs*

*Millett & Bristol (2002)

St Joseph Atoll also qualifies under category A4iii (more than 10,000 pairs of seabirds), making it the only site in the outer islands of Seychelles, outside the Aldabra group, to qualify under three categories, A4i, A4ii and A4iii. It may also meet the criteria for some migratory species, including Crab Plover *Dromas ardeola* (threshold 300 birds) and Ruddy Turnstone *Arenaria interpres* (350 birds) under category A4ii.

Clearly, St Joseph Atoll merits consideration as a candidate IBA. Another option would be to extend the boundaries of the existing D'Arros IBA to include the whole of St Joseph Atoll, given the

proximity of D'Arros, its rat-free status, the joint management of D'Arros with St Joseph Atoll and the fact that waters around both are important feeding grounds for seabirds.

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